

CLAIMS

1. A chemical mechanical polishing method for polishing
a low-k material insulating layer formed on a semiconductor
5 wafer, which method comprises:

preparing an aqueous abrasive slurry composed of a
water component, an abrasive component, a first additive for
making the low-k material insulating layer of said
semiconductor wafer hydrophilic in nature, and a second
10 additive for adding acidity to said aqueous abrasive slurry;

feeding said aqueous abrasive slurry to a rotating
polishing pad; and

applying and pressing the low-k material insulating
layer of said semiconductor wafer onto said rotating polishing
15 pad.

2. A chemical mechanical polishing method as set forth
in claim 1, wherein said low-k material insulating layer is
formed as a SiCOH layer.

3. A chemical mechanical polishing method as set forth
20 in claim 1, wherein said low-k material insulating layer is
formed as a methyl silsesquioxane layer.

4. A chemical mechanical polishing method as set forth
in claim 1, wherein a pressure at which the low-k material
insulating layer of said semiconductor wafer is pressed onto
25 said rotating polishing pad falls within a range between
approximately 3 psi and approximately 5 psi.

5. A chemical mechanical polishing method as set forth
in claim 1, wherein said abrasive component comprises 20 wt%
colloidal silica.

30 6. A chemical mechanical polishing method as set forth
in claim 1, wherein said first additive comprises a hydroxide
selected from the group consisting of aluminum hydroxide
(Al(OH)₃) and potassium hydroxide (KOH).

7. A chemical mechanical polishing method as set forth in claim 6, wherein at most 2 wt% of said hydroxide is contained in said aqueous abrasive slurry.

8. A chemical mechanical polishing method as set forth
5 in claim 1, wherein an amount of said second additive contained in said aqueous abrasive slurry is determined such that said aqueous abrasive slurry exhibits a pH falling in a range between approximately 3 and approximately 6.

9. A chemical mechanical polishing method as set forth
10 in claim 1, wherein said low-k material insulating layer exhibits a dielectric constant of at most 3.0.

10. A chemical mechanical polishing method as set forth in claim 1, further comprising:

washing said semiconductor wafer, which is drenched
15 with said aqueous abrasive slurry, with an aqueous washing solution; and

rinsing the washed semiconductor wafer with pure water.

11. A chemical mechanical polishing method as set forth
20 in claim 10, wherein said aqueous washing solution is prepared as an aqueous oxalic acid ($C_2H_2O_4$) solution.

12. A chemical mechanical polishing method as set forth in claim 10, wherein said aqueous washing solution is prepared as an aqueous dilute hydrofluoric acid (DHF) solution.

25 13. A chemical mechanical polishing method as set forth in claim 1, wherein said low-k material insulating layer is formed of a material having a methyl radical.

14. A washing/rinsing method for removing residual substances from a low-k material insulating layer of a
30 semiconductor device, chemically and mechanically polished by using an aqueous abrasive slurry composed of a water component,

an abrasive component, a first additive for making the low-k material insulating layer of said semiconductor wafer hydrophilic in nature, and a second additive for adding acidity to said aqueous abrasive slurry, which method
5 comprises:

washing said semiconductor wafer, which is drenched with said aqueous abrasive slurry, with an aqueous washing solution; and

10 rinsing the washed semiconductor wafer with pure water.

15. A washing/rinsing method as set forth in claim 14, wherein said aqueous washing solution is prepared as an aqueous oxalic acid ($C_2H_2O_4$) solution.

16. A washing/rinsing method as set forth in claim 14,
15 wherein said aqueous washing solution is prepared as an aqueous dilute hydrofluoric acid (DHF) solution.